Session SM3.2 "Analysis and modeling of spatiotemporal earthquake occurrence: challenges and perspectives"

Chat time: Monday, **4 May 2020**, **10:45–12:30**

There are many interesting topics we are going to discuss during our live, text-based chat. Among them, advances in earthquake forecasting at different time scales; advances in the analysis of spatiotemporal properties of seismicity; challenges affecting the analysis and modeling of spatiotemporal earthquake occurrence.

Displays will be discussed in order of appearance. If there is time left, there will be an open discussion.
You should definitely not miss our rich session:

1. Be aware of the Occam's razor !

Models that are much simpler than artificial neural network (ANN) models seem to offer similar predictive powers, if not better. This is the conclusion of the solicited presentation: "*Neural Network Applications in Earthquake Prediction (1994-2019): Meta-Analytic & Statistical Insights on their Limitations*", by **Arnaud Mignan** and Marco Broccardo. The display consists of a video you can visualize at this link: https://www.youtube.com/watch?v=3y-QVifQ_IE.

Do you think that Coulomb stress is the best choice for aftershock forecasting? **Shubham Sharma et al.** demonstrate that simple methods of stress calculations perform better than the classic Coulomb failure stress calculations —> link

2. The *b*-value as a precursor of large events

Our highlighted presentation is "*Real-time discrimination of earthquake foreshocks and aftershocks*", by **Laura Gulia** and Stefan Wiemer. They suggest that the *b*-value of an ongoing aftershock sequence could act as an indicator of a future larger earthquake. Unfortunately, Laura cannot take part in the live chat on Monday, but you can look at her presentation here and post a comment.

Emanuele Biondini et al. use retrospective forecasting to test the use of the *b*-value as precursor of large events —> link

3. Improving short-term earthquake forecast models [ETAS]

Eugenio Lippiello et al. propose a novel procedure which gives accurate occurrence probabilities of post-seismic strong ground shaking within 30 minutes after the mainshock —> [link](#)

Leila Mizrahi et al. propose an alternative formulation of ETAS parameter inversion, which accounts for a time-dependent magnitude of completeness —> [link](#)

Christian Grimm et al. present the results of an ETAS model of aftershock sequences with a focus on earthquake doublets —> [link](#)

4. Fluid injections and seismic hazard

Stephen Bourne and Steve Oates show how statistical mechanics-based models can improve forecasting of induced seismicity magnitudes —> [link](#)

Jordi Baro et al. use the Equivalent Statistical Model to give new insights on seismc hazard due to fluid injections —> [link](#)

5. Seismicity analysis

Hyperbolic graphs are those that are closely approximated by trees. Earthquake proximity networks (in data and ETAS model) are hyperbolic graphs. **Ilya Zaliapin et al.** show that the Baiesi-Paczuski proximity is a natural approximation to a proper hyperbolic metric. Unfortunately, Ilya cannot take part in the live chat on Monday, but you can look at his presentation [here](#) and post a comment.

Behnam Maleki Asayesh et al. used recently published high-quality focal mechanisms and hypocenters to reassess the role of small to moderate earthquakes for static stress triggering of aftershocks during the Bam earthquake. Unfortunately, **Behnam** cannot take part in the live chat on Monday, but you can look at his presentation [here](#) and post a comment.

Myunghyun Noh discusses about the effects of combining catalogs with different magnitude completeness —> [link](#)

Corentin Gouache et al. present a generator of earthquakes for a low-seismicity context (French mainland) —> [link](#)